

## Note on Performance Issues with Some Games on Dual-Core Systems

Some games are experiencing performance issues on dual-core systems. This is due to software developers' use of RDTSC (Read time-stamp counter) which has limitations that are now being seen with the new dual-core systems, and could also be seen on a multi-processor system (MP system). Timestamp counters in different cores or different CPUs are not guaranteed to be in sync, and simply setting thread or process affinity is not a safe fix for using RDTSC in production code, because Windows® is not always guaranteed to honor the affinity request.

Primarily, when using the RDTSC instruction on dual-core, or MP systems, software needs to be written to account for the fact that when running under a Windows environment, threads can be scheduled to run on other CPU cores. If the thread that executed the RDTSC is moved to another CPU core (after reading the RDTSC counter on the previous core), then the RDTSC counter on the subsequent CPU core may not be synchronized with the CPU core where the value was originally read. Power-management, such as clock-throttling, may also affect the use of the RDTSC instruction on a dual-core and MP system.

Instead of RDTSC, you should be using the Windows API which uses the QueryPerformanceCounter and QueryPerformanceFrequency routines. It is recommended that the QPC call only be made a few times per frame (ideally once). If RDTSC is being used for custom profiling routines, then special care must be applied to ensure that the application always run on a single core with Cool 'n' Quiet™ power management disabled.

For more information, please visit the Microsoft® knowledge base article at:  
<http://support.microsoft.com/kb/909944>

Microsoft has also written a white paper for developers ([Game Timing and Multicore Processors](#)) further describing the issue and the recommended solutions for games currently in development as well as already released products that are experiencing the issues. Please read over this white paper and follow the instructions laid out by Microsoft to ensure that your products will perform well on dual-core and multi-processor systems.

Finally, ensure you are running the correct AMD Athlon™ 64 X2 Dual Core Processor driver by visiting the AMD driver download page at:  
[http://www.amd.com/us-en/Processors/TechnicalResources/0,,30\\_182\\_871\\_13118,00.html](http://www.amd.com/us-en/Processors/TechnicalResources/0,,30_182_871_13118,00.html)

*Driver version 1.2.2.2 for 32-Bit systems*

*Driver version 1.2.2.1 for 64-Bit systems*

**Feel free to distribute this driver in your game installs as long as you follow the software license agreement.**